Chemical Analysis Report

TLH-ROC-2022-01-06-02

Florida Department of Environmental Protection
Central Laboratory
2600 Blair Stone Road
Tallahassee, FL 32399-2400
DOH Accreditation E31780

Event Description: **Run 8**
Request ID: **RQ-2022-01-03-59**
Customer: **TLH-ROC**
Project ID: **SMP**

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Certified by: Thekkekalathil Chandrasekhar, Environmental Consultant Date Certified: 27-JAN-2022 10:26

Case Narrative

Unless otherwise noted, all samples included in this report were received in accordance with protocols referenced in Chapter 62-160, Florida Administrative Code (F.A.C.). Results published in this report pertain only to the samples as submitted to, and received by the laboratory. All times in this report are adjusted to the applicable Eastern Time Zone (EST or EDT).

Results for the following analytical groups are included in this report: Metals and Nutrients.

Scientific notation may be used in reporting very large or small values. Values reported using scientific notation will take the form of the following example: 1.3E+03, which is equivalent to 1.3×10^3 or 1300.

Unless otherwise noted, analytical values for soil and sediment samples are reported on a dry weight basis, and analytical values for waste and tissue samples are reported on a wet weight basis.

Results for TNI accredited tests met requirements established by The NELAC Institute. A double asterisk (**) is used to indicate an analyte/matrix/method for which the laboratory is not TNI accredited by the Florida Department of Health Environmental Laboratory Certification Program or where accreditation for that field of testing is not applicable.

Any significant anomalies or deviations from established protocols are documented in Non-Conformance Reports, which, where appropriate, are included within this analytical report. Additional comments related to specific analytical tests may be included as remarks following the analytical results for each sample. Such comments and remarks are for informational purposes only and are not intended to convey judgement about the usability of the reported data.

A quality control report on the performance of the test method for the submitted samples is included. Uncertainty associated with the analytical results contained in this report can be estimated from the reported quality assurance results and from published quality control acceptance limits for each analytical test. Matrix quality control results (matrix spike recoveries and matrix sample precision) pertain only to the matrix sample tested and do not necessarily reflect test method performance for other samples.

Typical matrix quality control (QC) measurements may include matrix spike recovery, matrix spike duplicate recovery, matrix spike precision and matrix sample precision. Not all matrix QC results may be available or reportable; where they are not an explanation is provided. Typical reasons for unavailable QC results include, but are not limited to, a) insufficient matrix sample to perform some or all QC measurements; b) analyte concentration in the sample replicated was too low for a meaningful measurement of precision and c) analyte concentration in the matrix sample spiked was too high (relative to the amount of analyte spiked) for a meaningful measurement of recovery. Where matrix QC results are unavailable, other method performance metrics (e.g., LCS recovery, LCS precision, surrogate recovery) may be used to assess performance of the method. Comments explaining any missing QC measurements are not intended to convey any adverse conclusions about the quality of the reported data.

Precision is reported as relative percent difference unless otherwise noted.

Quality Control codes as defined below may be used in this report to indicate results that are associated with one or more quality control elements which did not fall within established test method criteria. Such results may be qualified as estimates using a J qualifier as required by 62-160 F.A.C. Explanations are included in the report for any results that were reported as estimates for other reasons.

QC Codes used in this report may include:

- LCS – Recovery for the batch Laboratory Control Sample (LCS) was outside existing control limits;
- MS – Recovery for the batch matrix spike (MS) was outside existing control limits;
- CCV – Recovery for a continuing calibration verification (CCV) standard was outside existing control limits;
- SUR – Recovery of a surrogate (SUR) for associated analytes was outside existing control limits;
- RPD – The precision, measured as relative percent difference (RPD), of batch replicate measurements was outside existing control limits;
- RSD – The precision, measured as relative standard deviation (RSD), of batch replicate measurements was outside existing control limits;
- SMP – Sample - used precision derived from replicate analyses of a sample;

The following data qualifiers are used, where applicable, in this report as specified in 62-160 F.A.C.

- A - Value reported is the mean of two or more determinations.
- B - Results based on colony counts outside the acceptable range.
- I - The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
- J - Estimated value and/or the analysis did not meet established quality control criteria.
- K - Actual value is known to be less than value given.
- L - Actual value is known to be greater than value given.
- N - Presumptive evidence of presence of material.
- O - Sampled, but analysis lost or not performed.
- Q - Sample held beyond normal holding time.
- T - Value reported is less than the criterion of detection.
- U - Material was analyzed for but not detected. The reported value is the method detection limit for the sample analyzed.
- V - Analyte was detected in both sample and method blank.
- X - Too few individuals to calculate SCI value.
- Y - The laboratory analysis was from an unpreserved or improperly preserved sample. The data may not be accurate.
- Z - Colonies were too numerous to count (TNTC).

Quality control information from overflow laboratories may not be included in this report. Please refer to the associated report from the overflow laboratory for additional information.

Sample Location: Apalachicola River .8 miles Upstream Owl Creek **Collection Date/Time: 01/06/2022 10:15**

Field ID: G2TLHR0042 Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2298004	EPA 180.1 Rev. 2.0	Turbidity	13	A	NTU	P408255	
	EPA 300.0 Rev. 2.1	Chloride	6.0		mg Cl/L	P408946	
		Sulfate	6.9		mg SO4/L	P408949	
	SM 2120 B-2011	Color (true)**	24	A	PCU	P408261	
	SM 2320 B-2011	Total Alkalinity	39		mg CaCO3/L	P408276	
	SM 2540 C-2011	TDS	60		mg/L	P408445	
	SM 2540 D-2011	TSS	9	I	mg/L	P408436	
	SM 4500 F-C-2011	Fluoride	0.059	I	mg F/L	P408279	
2298006	EPA 350.1 Rev. 2.0	Ammonia-N	0.023		mg N/L	P408557	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.29		mg N/L	P408393	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.55		mg N/L	P408418	
	EPA 365.1 Rev. 2.0	Total-P	0.045		mg P/L	P408339	
	SM 5310 B-2011	Organic Carbon	3.0		mg C/L	P408472	
2298008	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.016		mg P/L	P408245	
2298014	EPA 200.7 Rev. 4.4	Calcium	13.0		mg/L	P408272	
		Iron	840		ug/L	P408272	
		Magnesium	1.87		mg/L	P408272	
		Potassium	2.0		mg/L	P408272	
		Sodium	6.6		mg/L	P408272	
		Strontium	28.8		ug/L	P408272	
		Tin	3.0	U	ug/L	P408272	
		Titanium	11.6		ug/L	P408272	
		Vanadium	2.0	U	ug/L	P408272	
		Zinc	5.0	U	ug/L	P408272	
	EPA 200.8 Rev. 5.4	Aluminum	410		ug/L	P408272	
		Antimony	0.072	I	ug/L	P408272	
		Arsenic	0.39		ug/L	P408272	
		Barium	21.0		ug/L	P408272	
		Beryllium	0.041		ug/L	P408272	
		Boron**	18.9		ug/L	P408272	
		Cadmium	0.020	U	ug/L	P408272	
		Chromium	0.81	I	ug/L	P408272	
		Cobalt	0.248		ug/L	P408272	
		Copper	0.68	I	ug/L	P408272	
		Lead	0.40	I	ug/L	P408272	
		Manganese	45.6		ug/L	P408272	
		Molybdenum	0.27	I	ug/L	P408272	
		Nickel	0.50	U	ug/L	P408272	
		Selenium	0.20	U	ug/L	P408272	
		Silver	0.010	U	ug/L	P408272	
		Thallium	0.10	U	ug/L	P408272	
	SM 2340B	Hardness	40.2		mg/L	P408272	

Field ID: G2TLHR0042 Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes

Ref. Method and Comment:
SM 2540 D-2011: Batch relative percent difference is unavailable because of low analyte concentration in the QC sample.
EPA 200.7 Rev. 4.4: Batch matrix spike recoveries for calcium, magnesium, potassium and sodium are unavailable for one of two spiked samples because of high analyte concentration in the QC sample.

Sample Location: Brothers River @ Mouth **Collection Date/Time: 01/06/2022 11:45**

Field ID: G2TLHR0013 Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2298005	EPA 180.1 Rev. 2.0	Turbidity	17		NTU	P408255	
	EPA 300.0 Rev. 2.1	Chloride	6.0		mg Cl/L	P408946	
		Sulfate	7.0		mg SO4/L	P408949	
	SM 2120 B-2011	Color (true)**	31	J	PCU	P408261	
	SM 2320 B-2011	Total Alkalinity	39		mg CaCO3/L	P408276	
	SM 2540 C-2011	TDS	62		mg/L	P408445	
	SM 2540 D-2011	TSS	9	I	mg/L	P408436	
	SM 4500 F-C-2011	Fluoride	0.058	I	mg F/L	P408279	
2298007	EPA 350.1 Rev. 2.0	Ammonia-N	0.017		mg N/L	P408714	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.24		mg N/L	P408393	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.42		mg N/L	P408418	
	EPA 365.1 Rev. 2.0	Total-P	0.035		mg P/L	P408339	
	SM 5310 B-2011	Organic Carbon	3.1		mg C/L	P408472	
2298009	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.011		mg P/L	P408245	
2298015	EPA 200.7 Rev. 4.4	Calcium	13.2		mg/L	P408272	
		Iron	570		ug/L	P408272	
		Magnesium	1.89		mg/L	P408272	
		Potassium	2.0		mg/L	P408272	
		Sodium	6.6		mg/L	P408272	
		Strontium	28.5		ug/L	P408272	
		Tin	3.0	U	ug/L	P408272	
		Titanium	4.9		ug/L	P408272	
		Vanadium	2.0	U	ug/L	P408272	
		Zinc	5.0	U	ug/L	P408272	
	EPA 200.8 Rev. 5.4	Aluminum	241		ug/L	P408272	
		Antimony	0.065	I	ug/L	P408272	
		Arsenic	0.32		ug/L	P408272	
		Barium	19.4		ug/L	P408272	
		Beryllium	0.033	I	ug/L	P408272	
		Boron**	18.9		ug/L	P408272	
		Cadmium	0.020	U	ug/L	P408272	
		Chromium	0.45	I	ug/L	P408272	
		Cobalt	0.150		ug/L	P408272	
		Copper	0.62	I	ug/L	P408272	
		Lead	0.36	I	ug/L	P408272	
		Manganese	25.7		ug/L	P408272	
		Molybdenum	0.21	I	ug/L	P408272	
		Nickel	0.50	U	ug/L	P408272	
		Selenium	0.20	U	ug/L	P408272	
		Silver	0.010	U	ug/L	P408272	
		Thallium	0.10	U	ug/L	P408272	
	SM 2340B	Hardness	40.7		mg/L	P408272	

Field ID: G2TLHR0013 Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes

Ref. Method and Comment:
SM 2120 B-2011: The result may be biased high because of matrix interference.
SM 2540 D-2011: Batch relative percent difference is unavailable because of low analyte concentration in the QC sample.
EPA 200.7 Rev. 4.4: Batch matrix spike recoveries for calcium, magnesium, potassium and sodium are unavailable for one of two spiked samples because of high analyte concentration in the QC sample.

Quality Assurance Report
Method Blank Results

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P408255

Component	Result	Code	Units
Turbidity	0.10	U	NTU

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P408272

Component	Result	Code	Units
Calcium	0.075	U	mg/L
Iron	30	U	ug/L
Magnesium	0.040	U	mg/L
Potassium	0.30	U	mg/L
Sodium	0.50	U	mg/L
Strontium	2.0	U	ug/L
Tin	3.0	U	ug/L
Titanium	0.75	U	ug/L
Vanadium	2.0	U	ug/L
Zinc	5.0	U	ug/L

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P408272

Component	Result	Code	Units
Aluminum	5.0	U	ug/L
Antimony	0.050	U	ug/L
Arsenic	0.050	U	ug/L
Barium	0.20	U	ug/L
Beryllium	0.010	U	ug/L
Boron	2.0	U	ug/L
Cadmium	0.020	U	ug/L
Chromium	0.40	U	ug/L
Cobalt	0.020	U	ug/L
Copper	0.40	U	ug/L
Lead	0.20	U	ug/L
Manganese	0.10	U	ug/L
Molybdenum	0.15	U	ug/L
Nickel	0.50	U	ug/L
Selenium	0.20	U	ug/L
Silver	0.010	U	ug/L
Thallium	0.10	U	ug/L

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P408946

Component	Result	Code	Units
Chloride	0.20	U	mg Cl/L

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P408949

Component	Result	Code	Units
Sulfate	0.20	U	mg SO4/L

Quality Assurance Report
Method Blank Results

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P408557

Component	Result	Code	Units
Ammonia-N	0.002	U	mg N/L

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P408714

Component	Result	Code	Units
Ammonia-N	0.002	U	mg N/L

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P408393

Component	Result	Code	Units
Kjeldahl Nitrogen	0.080	U	mg N/L

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P408418

Component	Result	Code	Units
NO2NO3-N	0.004	U	mg N/L

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P408339

Component	Result	Code	Units
Total-P	0.002	U	mg P/L

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P408245

Component	Result	Code	Units
O-Phosphate-P	0.004	U	mg P/L

Reference Method: SM 2120 B-2011
Batch ID: P408261

Component	Result	Code	Units
Color (true)	2.5	U	PCU

Reference Method: SM 2320 B-2011
Batch ID: P408276

Component	Result	Code	Units
Total Alkalinity	0.65	U	mg CaCO3/L

Reference Method: SM 2540 C-2011
Batch ID: P408445

Component	Result	Code	Units
TDS	15	U	mg/L

Quality Assurance Report
Method Blank Results

Reference Method: SM 2540 D-2011
Batch ID: P408436

Component	Result	Code	Units
TSS	2	U	mg/L

Reference Method: SM 4500 F-C-2011
Batch ID: P408279

Component	Result	Code	Units
Fluoride	0.035	U	mg F/L

Reference Method: SM 5310 B-2011
Batch ID: P408472

Component	Result	Code	Units
Organic Carbon	0.50	U	mg C/L

Quality Assurance Report
Laboratory Control Sample Accuracy

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P408272

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Calcium	105		P	85 - 115
Iron	106		P	85 - 115
Magnesium	103		P	85 - 115
Potassium	101		P	85 - 115
Sodium	102		P	85 - 115
Strontium	99.6		P	85 - 115
Tin	103		P	85 - 115
Titanium	102		P	85 - 115
Vanadium	100		P	85 - 115
Zinc	104		P	85 - 115

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P408272

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Aluminum	99.3		P	85 - 115
Antimony	99.3		P	85 - 115
Arsenic	101		P	85 - 115
Barium	105		P	85 - 115
Beryllium	98.8		P	85 - 115
Boron	95.2		P	85 - 115
Cadmium	103		P	85 - 115
Chromium	101		P	85 - 115
Cobalt	97.0		P	85 - 115
Copper	99.7		P	85 - 115
Lead	96.9		P	85 - 115
Manganese	99.5		P	85 - 115
Molybdenum	102		P	85 - 115
Nickel	99.6		P	85 - 115
Selenium	101		P	85 - 115
Silver	101		P	85 - 115
Thallium	108		P	85 - 115

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P408946

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Chloride	102		P	90 - 110

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P408949

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Sulfate	99.5		P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P408557

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Ammonia-N	96.0		P	90 - 110

Quality Assurance Report
Laboratory Control Sample Accuracy

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P408714

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Ammonia-N	97.6		P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P408393

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Kjeldahl Nitrogen	103		P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P408418

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
NO2NO3-N	101		P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P408339

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Total-P	110		P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P408245

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
O-Phosphate-P	99.6		P	90 - 110

Reference Method: SM 2120 B-2011
Batch ID: P408261

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Color (true)	99.7		P	85 - 115

Reference Method: SM 2320 B-2011
Batch ID: P408276

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Total Alkalinity	100		P	94 - 106

Reference Method: SM 4500 F-C-2011
Batch ID: P408279

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Fluoride	98.7		P	93 - 104

Reference Method: SM 5310 B-2011
Batch ID: P408472

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Organic Carbon	97.5		P	85 - 115

Quality Assurance Report
Matrix Spike Accuracy

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P408272

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2297802	Calcium	102		P	80 - 120
2297802	Iron	103		P	80 - 120
2297802	Strontium	96.3		P	80 - 120
2297802	Tin	95.4		P	80 - 120
2297802	Titanium	101		P	80 - 120
2297802	Vanadium	101		P	80 - 120
2297802	Zinc	98.9		P	80 - 120
2298040	Iron	99.2	101	P/P	80 - 120
2298040	Magnesium	97.2		P	80 - 120
2298040	Potassium	93.9	95.6	P/P	80 - 120
2298040	Sodium	96.9		P	80 - 120
2298040	Strontium	96.4	95.9	P/P	80 - 120
2298040	Tin	94.2	96.2	P/P	80 - 120
2298040	Titanium	99.8	99.5	P/P	80 - 120
2298040	Vanadium	99.6	99.4	P/P	80 - 120
2298040	Zinc	99.5	99.5	P/P	80 - 120

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P408272

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2297802	Aluminum	104		P	80 - 120
2297802	Antimony	109		P	80 - 120
2297802	Arsenic	109		P	80 - 120
2297802	Barium	108		P	80 - 120
2297802	Beryllium	108		P	80 - 120
2297802	Boron	99.6		P	80 - 120
2297802	Cadmium	104		P	80 - 120
2297802	Chromium	106		P	80 - 120
2297802	Cobalt	102		P	80 - 120
2297802	Copper	99.2		P	80 - 120
2297802	Lead	102		P	80 - 120
2297802	Manganese	105		P	80 - 120
2297802	Molybdenum	113		P	80 - 120
2297802	Nickel	102		P	80 - 120
2297802	Selenium	104		P	80 - 120
2297802	Silver	97.9		P	80 - 120
2297802	Thallium	113		P	80 - 120
2298040	Aluminum	101	101	P/P	80 - 120
2298040	Antimony	106	105	P/P	80 - 120
2298040	Arsenic	107	105	P/P	80 - 120
2298040	Barium	110	107	P/P	80 - 120
2298040	Beryllium	104	102	P/P	80 - 120
2298040	Boron	104	101	P/P	80 - 120
2298040	Cadmium	108	103	P/P	80 - 120
2298040	Chromium	107	105	P/P	80 - 120
2298040	Cobalt	102	101	P/P	80 - 120
2298040	Copper	102	99.7	P/P	80 - 120
2298040	Lead	100	98.8	P/P	80 - 120
2298040	Manganese	109	104	P/P	80 - 120
2298040	Molybdenum	111	110	P/P	80 - 120
2298040	Nickel	106	104	P/P	80 - 120

Quality Assurance Report
Matrix Spike Accuracy

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P408272

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2298040	Selenium	105	104	P/P	80 - 120
2298040	Silver	101	100	P/P	80 - 120
2298040	Thallium	115	114	P/P	80 - 120

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P408946

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2297957	Chloride	103		P	90 - 110
2298029	Chloride	105		P	90 - 110

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P408949

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2297957	Sulfate	97.5		P	90 - 110
2298029	Sulfate	101		P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P408557

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2297880	Ammonia-N	95.2	95.8	P/P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P408714

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2298007	Ammonia-N	97.4	96.4	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P408393

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2298032	Kjeldahl Nitrogen	104	99.0	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P408418

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2298032	NO2NO3-N	95.0	95.0	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P408339

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2298007	Total-P	108	110	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P408245

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits

Quality Assurance Report
Matrix Spike Accuracy

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P408245

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2298009	O-Phosphate-P	98.5	98.7	P/P	90 - 110

Reference Method: SM 4500 F-C-2011
Batch ID: P408279

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2297957	Fluoride	99.1	100	P/P	92 - 107

Reference Method: SM 5310 B-2011
Batch ID: P408472

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2297630	Organic Carbon	95.0	96.0	P/P	85 - 115

Quality Assurance Report
Precision

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P408255

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2298004	Turbidity	3.08	Sample	P	0 - 20

Reference Method: EPA 200.7 Rev. 4.4
Batch ID: P408272

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2298040	Calcium	1.15	Spike	P	0 - 20
2298040	Iron	1.08	Spike	P	0 - 20
2298040	Magnesium	2.13	Spike	P	0 - 20
2298040	Potassium	1.21	Spike	P	0 - 20
2298040	Sodium	0.703	Spike	P	0 - 20
2298040	Strontium	0.459	Spike	P	0 - 20
2298040	Tin	2.10	Spike	P	0 - 20
2298040	Titanium	0.219	Spike	P	0 - 20
2298040	Vanadium	0.289	Spike	P	0 - 20
2298040	Zinc	0.00363	Spike	P	0 - 20

Reference Method: EPA 200.8 Rev. 5.4
Batch ID: P408272

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2298040	Aluminum	0.0389	Spike	P	0 - 20
2298040	Antimony	1.08	Spike	P	0 - 20
2298040	Arsenic	2.22	Spike	P	0 - 20
2298040	Barium	2.03	Spike	P	0 - 20
2298040	Beryllium	1.57	Spike	P	0 - 20
2298040	Boron	1.59	Spike	P	0 - 20
2298040	Cadmium	4.00	Spike	P	0 - 20
2298040	Chromium	1.12	Spike	P	0 - 20
2298040	Cobalt	1.19	Spike	P	0 - 20
2298040	Copper	2.13	Spike	P	0 - 20
2298040	Lead	1.47	Spike	P	0 - 20
2298040	Manganese	3.62	Spike	P	0 - 20
2298040	Molybdenum	1.32	Spike	P	0 - 20
2298040	Nickel	2.28	Spike	P	0 - 20
2298040	Selenium	1.38	Spike	P	0 - 20
2298040	Silver	0.355	Spike	P	0 - 20
2298040	Thallium	0.361	Spike	P	0 - 20

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P408946

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2297957	Chloride	0.246	Sample	P	0 - 20

Quality Assurance Report
Precision

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P408949

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2297957	Sulfate	0.00481	Sample	P	0 - 20

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P408557

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2297880	Ammonia-N	0.463	Spike	P	0 - 20

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P408714

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2298007	Ammonia-N	0.765	Spike	P	0 - 20

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P408393

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2298032	Kjeldahl Nitrogen	3.75	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P408418

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2298032	NO2NO3-N	0.0	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P408339

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2298007	Total-P	1.16	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P408245

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2298009	O-Phosphate-P	0.183	Spike	P	0 - 20

Reference Method: SM 2120 B-2011
Batch ID: P408261

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2298004	Color (true)	1.96	Sample	P	0 - 20

Quality Assurance Report
Precision

Reference Method: SM 2320 B-2011
Batch ID: P408276

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2297957	Total Alkalinity	0.755	Sample	P	0 - 5.2

Reference Method: SM 2540 C-2011
Batch ID: P408445

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2297164	TDS	3.61	Sample	P	0 - 10

Reference Method: SM 4500 F-C-2011
Batch ID: P408279

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2297957	Fluoride	0.967	Spike	P	0 - 2.1

Reference Method: SM 5310 B-2011
Batch ID: P408472

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2297630	Organic Carbon	0.945	Spike	P	0 - 20

* Sample, spike and/or laboratory control sample precision (LCS) is reported.

Quality Assurance Report
Calibration Verification

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Run ID: A109743
Included Lab Sample IDs: 2298008, 2298009

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
O-Phosphate-P	99.7	99.7	P/P	90 - 110

Reference Method: EPA 180.1 Rev. 2.0
Run ID: A109749
Included Lab Sample IDs: 2298004, 2298005

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Turbidity	100	100	P/P	95 - 105

Reference Method: SM 2120 B-2011
Run ID: A109752
Included Lab Sample IDs: 2298004, 2298005

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Color (true)	99.9	95.0	P/P	85 - 115

Reference Method: SM 2320 B-2011
Run ID: A109759
Included Lab Sample IDs: 2298004, 2298005

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total Alkalinity	97.0	101	P/P	90 - 110

Reference Method: SM 4500 F-C-2011
Run ID: A109759
Included Lab Sample IDs: 2298004, 2298005

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Fluoride	102	101	P/P	90 - 110

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A109777
Included Lab Sample IDs: 2298014, 2298015

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Aluminum	98.9	99.4	P/P	90 - 110
Antimony	98.7	99.8	P/P	90 - 110
Arsenic	99.2	97.6	P/P	90 - 110
Barium	99.8	99.4	P/P	90 - 110
Beryllium	94.5	96.0	P/P	90 - 110
Boron	98.4	102	P/P	90 - 110
Cadmium	102	102	P/P	90 - 110
Chromium	96.9	97.2	P/P	90 - 110
Cobalt	90.8	91.1	P/P	90 - 110
Copper	94.4	93.7	P/P	90 - 110
Lead	93.0	92.7	P/P	90 - 110
Manganese	98.3	99.1	P/P	90 - 110
Molybdenum	98.8	98.1	P/P	90 - 110
Nickel	93.6	93.8	P/P	90 - 110
Selenium	99.4	98.7	P/P	90 - 110
Silver	99.6	99.6	P/P	90 - 110

Quality Assurance Report
Calibration Verification

Reference Method: EPA 200.8 Rev. 5.4
Run ID: A109777
Included Lab Sample IDs: 2298014, 2298015

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Thallium	105	104	P/P	90 - 110

Reference Method: EPA 200.7 Rev. 4.4
Run ID: A109794
Included Lab Sample IDs: 2298014, 2298015

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Calcium	101	99.0	P/P	90 - 110
Iron	99.7	98.3	P/P	90 - 110
Magnesium	98.9	97.6	P/P	90 - 110
Potassium	95.3	94.1	P/P	90 - 110
Sodium	97.3	96.3	P/P	90 - 110
Strontium	97.5	96.8	P/P	90 - 110
Tin	95.5	96.9	P/P	90 - 110
Titanium	95.4	96.0	P/P	90 - 110
Vanadium	93.8	95.1	P/P	90 - 110
Zinc	94.8	97.9	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Run ID: A109817
Included Lab Sample IDs: 2298006, 2298007

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
NO2NO3-N	102	96.0	P/P	90 - 110

Reference Method: SM 5310 B-2011
Run ID: A109838
Included Lab Sample IDs: 2298006, 2298007

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Organic Carbon	97.0	97.2	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Run ID: A109878
Included Lab Sample IDs: 2298006, 2298007

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total-P	97.5	99.5	P/P	90 - 110
Total-P	98.8	97.5	P/P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Run ID: A109887
Included Lab Sample IDs: 2298006

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Ammonia-N	97.8	97.0	P/P	90 - 110

Quality Assurance Report
Calibration Verification

Reference Method: EPA 351.2 Rev. 2.0
Run ID: A109900
Included Lab Sample IDs: 2298006, 2298007

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Kjeldahl Nitrogen	102	101	P/P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Run ID: A109936
Included Lab Sample IDs: 2298007

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Ammonia-N	99.1	98.3	P/P	90 - 110

Reference Method: EPA 300.0 Rev. 2.1
Run ID: A110040
Included Lab Sample IDs: 2298004, 2298005

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Chloride	103	103	P/P	90 - 110
Sulfate	100	102	P/P	90 - 110

* Pass/Fail determinations are made for each bracketing calibration verification check.
Control limits for initial calibration checks may be different from those for continuing checks, depending on method requirements.
Where they are different, both control limits are provided.

Quality Assurance Report
Summary

Ref. Method	Analyte	LCS % Recovery	MS % Recovery			Precision		
						LCS	SMP	MS
EPA 180.1 Rev. 2.0	Turbidity						3.08	
EPA 200.7 Rev. 4.4	Calcium	105	102					1.15
	Iron	106	103	99.2	101			1.08
	Magnesium	103	97.2					2.13
	Potassium	101	93.9	95.6				1.21
	Sodium	102	96.9					0.703
	Strontium	99.6	96.3	96.4	95.9			0.459
	Tin	103	95.4	94.2	96.2			2.10
	Titanium	102	101	99.8	99.5			0.219
	Vanadium	100	101	99.6	99.4			0.289
	Zinc	104	98.9	99.5	99.5			0.0036
EPA 200.8 Rev. 5.4	Aluminum	99.3	101	101	104			0.0389
	Antimony	99.3	106	105	109			1.08
	Arsenic	101	107	105	109			2.22
	Barium	105	110	107	108			2.03
	Beryllium	98.8	104	102	108			1.57
	Boron	95.2	104	101	99.6			1.59
	Cadmium	103	108	103	104			4.00
	Chromium	101	107	105	106			1.12
	Cobalt	97.0	102	101	102			1.19
	Copper	99.7	102	99.7	99.2			2.13
	Lead	96.9	100	98.8	102			1.47
	Manganese	99.5	109	104	105			3.62
	Molybdenum	102	111	110	113			1.32
	Nickel	99.6	106	104	102			2.28
	Selenium	101	105	104	104			1.38
	Silver	101	101	100	97.9			0.355
	Thallium	108	115	114	113			0.361
EPA 300.0 Rev. 2.1	Chloride	102	103	105			0.246	
	Sulfate	99.5	97.5	101			0.0048	
EPA 350.1 Rev. 2.0	Ammonia-N	96.0	95.2	95.8				0.463
	Ammonia-N	97.6	97.4	96.4				0.765
EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	103	104	99.0				3.75
EPA 353.2 Rev. 2.0	NO2NO3-N	101	95.0	95.0				0.0
EPA 365.1 Rev. 2.0	Total-P	110	108	110				1.16
EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	99.6	98.5	98.7				0.183
SM 2120 B-2011	Color (true)	99.7					1.96	
SM 2320 B-2011	Total Alkalinity	100					0.755	
SM 2540 C-2011	TDS						3.61	
SM 4500 F-C-2011	Fluoride	98.7	99.1	100				0.967
SM 5310 B-2011	Organic Carbon	97.5	95.0	96.0				0.945

Reference Method Descriptions

Method	Description	Associated Samples
EPA 180.1 Rev. 2.0	Turbidity in aqueous matrices	2298004, 2298005
EPA 200.7 Rev. 4.4	Total Recoverable Metals analysis using ICP emission spectroscopy for aqueous samples supporting Clean Water Act Projects	2298014, 2298015
EPA 200.8 Rev. 5.4	Total Recoverable Metals analysis using ICP-MS for aqueous samples supporting Clean Water Act Projects	2298014, 2298015
EPA 300.0 Rev. 2.1	Chloride in aqueous matrices	2298004, 2298005
EPA 300.0 Rev. 2.1	Sulfate in aqueous matrices	2298004, 2298005
EPA 350.1 Rev. 2.0	Ammonia in aqueous matrices as mg N/L	2298006, 2298007

Reference Method Descriptions

Method	Description	Associated Samples
EPA 351.2 Rev. 2.0	Total Kjeldahl Nitrogen in aqueous matrices	2298006, 2298007
EPA 353.2 Rev. 2.0	Nitrite/Nitrate in aqueous matrices as mg N/L	2298006, 2298007
EPA 365.1 Rev. 2.0	Total Phosphorus in aqueous matrices as mg P/L	2298006, 2298007
EPA 365.1 Rev. 2.0 dissolved	Ortho-phosphate, dissolved, in filtered, aqueous matrices as mg P/L	2298008, 2298009
SM 2120 B-2011	True Color measured at 450 nm (not valid for NPDES monitoring)	2298004, 2298005
SM 2320 B-2011	Alkalinity in aqueous matrices as mg CaCO3/L	2298004, 2298005
SM 2340B	Hardness by calculation, in aqueous matrices, reported as mg/L CaCO3	2298014, 2298015
SM 2540 C-2011	Total Dissolved Solids in aqueous matrices	2298004, 2298005
SM 2540 D-2011	Total Suspended Solids in aqueous matrices using a maximum of 250 mL of sample	2298004, 2298005
SM 4500 F-C-2011	Fluoride in aqueous matrices, without distillation (not valid for NPDES monitoring)	2298004, 2298005
SM 5310 B-2011	Nonpurgeable Organic Carbon in aqueous matrices	2298006, 2298007

Preparation and Analysis Log

Ref. Method	Received Date	Prep Date/Time	Prepared By	Analysis Date/Time	Analyzed By	Associated Samples
EPA 180.1 Rev. 2.0	01/06/2022			01/07/2022 16:33	Khloe J Berg	2298004, 2298005
EPA 200.7 Rev. 4.4	01/06/2022	01/10/2022 11:00	Vijayalakshmi Reddy	01/11/2022 23:25	Josef B Mick	2298014
	01/06/2022	01/10/2022 11:00	Vijayalakshmi Reddy	01/11/2022 23:33	Josef B Mick	2298015
EPA 200.8 Rev. 5.4	01/06/2022	01/10/2022 11:00	Vijayalakshmi Reddy	01/10/2022 18:08	Emily M Philpot	2298014
	01/06/2022	01/10/2022 11:00	Vijayalakshmi Reddy	01/10/2022 18:18	Emily M Philpot	2298015
EPA 300.0 Rev. 2.1	01/06/2022			01/26/2022 05:45	Roberta Tatti	2298004
	01/06/2022			01/26/2022 05:57	Roberta Tatti	2298005
EPA 350.1 Rev. 2.0	01/06/2022			01/14/2022 13:07	Roberta Tatti	2298006
	01/06/2022			01/19/2022 11:37	Ping Hua	2298007
EPA 351.2 Rev. 2.0	01/06/2022	01/14/2022 10:30	Alexandra J Mattheus	01/14/2022 16:21	Alexandra J Mattheus	2298006
	01/06/2022	01/14/2022 10:30	Alexandra J Mattheus	01/14/2022 16:23	Alexandra J Mattheus	2298007
EPA 353.2 Rev. 2.0	01/06/2022			01/12/2022 09:05	Beverly Y. Sanders	2298006
	01/06/2022			01/12/2022 09:10	Beverly Y. Sanders	2298007
EPA 365.1 Rev. 2.0	01/06/2022	01/12/2022 15:15	Simonne.V. Calhoun	01/14/2022 13:02	Shengyu Ding	2298007
	01/06/2022	01/12/2022 15:15	Simonne.V. Calhoun	01/14/2022 13:10	Shengyu Ding	2298006
EPA 365.1 Rev. 2.0 dissolved	01/06/2022			01/07/2022 14:46	James L Waggerby	2298009
	01/06/2022			01/07/2022 14:49	James L Waggerby	2298008
SM 2120 B-2011	01/06/2022			01/07/2022 16:46	Sarah A Nixon	2298004
	01/06/2022			01/07/2022 16:47	Sarah A Nixon	2298005
SM 2320 B-2011	01/06/2022			01/08/2022 03:01	Dale L. Simmons	2298004
	01/06/2022			01/08/2022 03:12	Dale L. Simmons	2298005
SM 2340B	01/06/2022			01/11/2022 23:25	Josef B Mick	2298014
	01/06/2022			01/11/2022 23:33	Josef B Mick	2298015
SM 2540 C-2011	01/06/2022			01/07/2022 14:36	Yijie Li	2298004, 2298005
SM 2540 D-2011	01/06/2022			01/07/2022 14:36	Yijie Li	2298004, 2298005
SM 4500 F-C-2011	01/06/2022			01/08/2022 03:01	Dale L. Simmons	2298004
	01/06/2022			01/08/2022 03:12	Dale L. Simmons	2298005
SM 5310 B-2011	01/06/2022			01/12/2022 11:05	Nathaniel J Jones	2298006
	01/06/2022			01/12/2022 11:19	Nathaniel J Jones	2298007